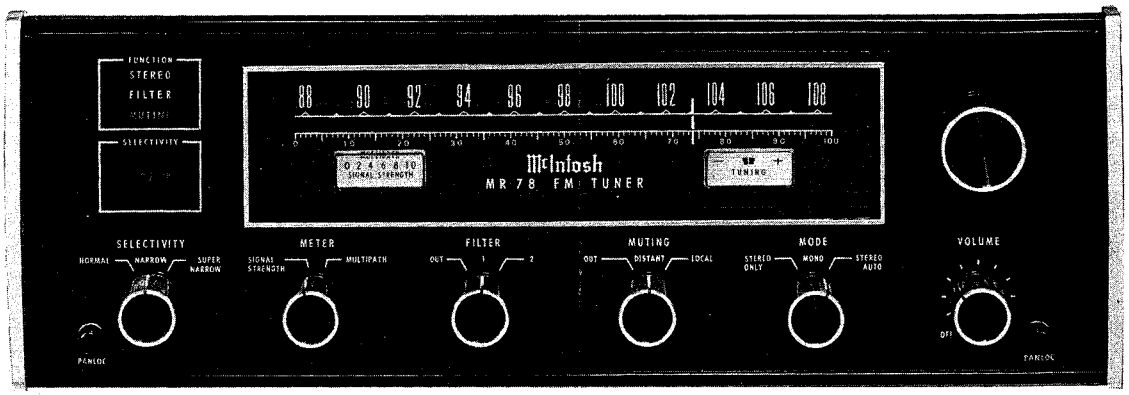
McIntosh

MR 78

FM TUNER



SERVICE INFORMATION

STARTING WITH SERIAL NO. AD1001

McINTOSH LABORATORY INC. 2 CHAMBERS STREET BINGHAMTON, NEW YORK

ELECTRICAL SPECIFICATIONS

SENSITIVITY

2μV for better than 35dB quieting. 2.5μV IHF usable sensitivity Max., 1.9μV typical.

SELECTIVITY IHF

	ADJECENT CHANNEL	ALTERNATE CHANNEL
Normal	7dB	55dB
Narrow	22dB	>90dB
Super-Narrow	55dB	≫90dB

SIGNAL TO NOISE RATIO

Better than 75dB below 100% modulation.

HARMONIC DISTORTION

Less than 0.2% mono or stereo at 100% modulation 20Hz to 18kHz. Typically less than 0.05% at 1kHz.

FREQUENCY RESPONSE

± 1dB 20Hz to 18kHz with standard 75μS de-emphasis.

CAPTURE RATIO

Better than 2.5dB IHF.

SPURIOUS REJECTION

Greater than 100dB IHF.

IMAGE REJECTION

Greater than 100dB 88 to 108MHz IHF.

STEREO SEPARATION

Better than 40dB at 1kHz.

SCA FILTER

50dB down from 67kHz to 74kHz; 275dB per octave slope.

POWER REQUIREMENTS

120VAC, 50 - 60Hz, 35W.

(NORMAL SELECTIVITY UNLESS OTHERWISE STATED)

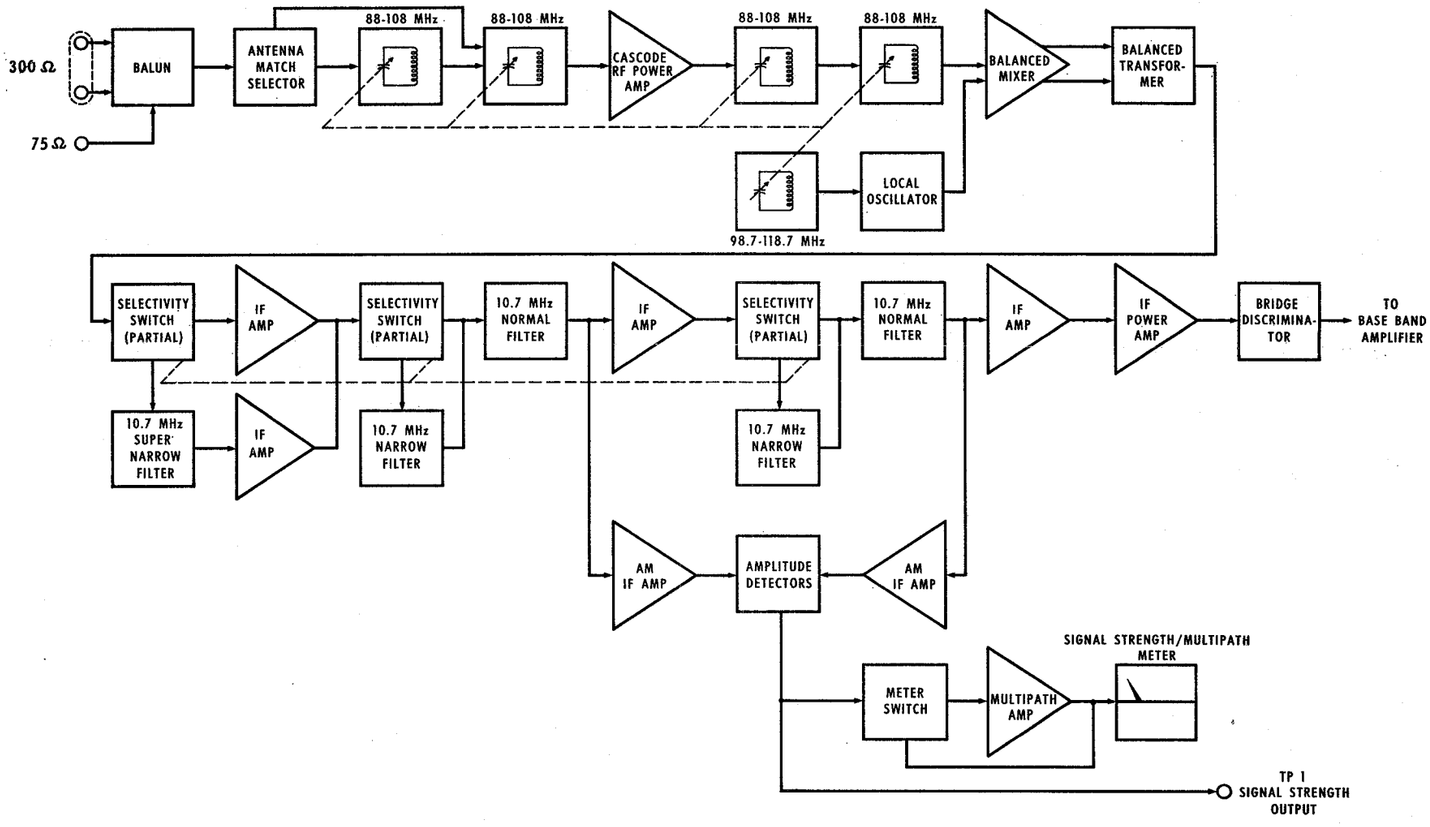
SCHEMATIC NOTES

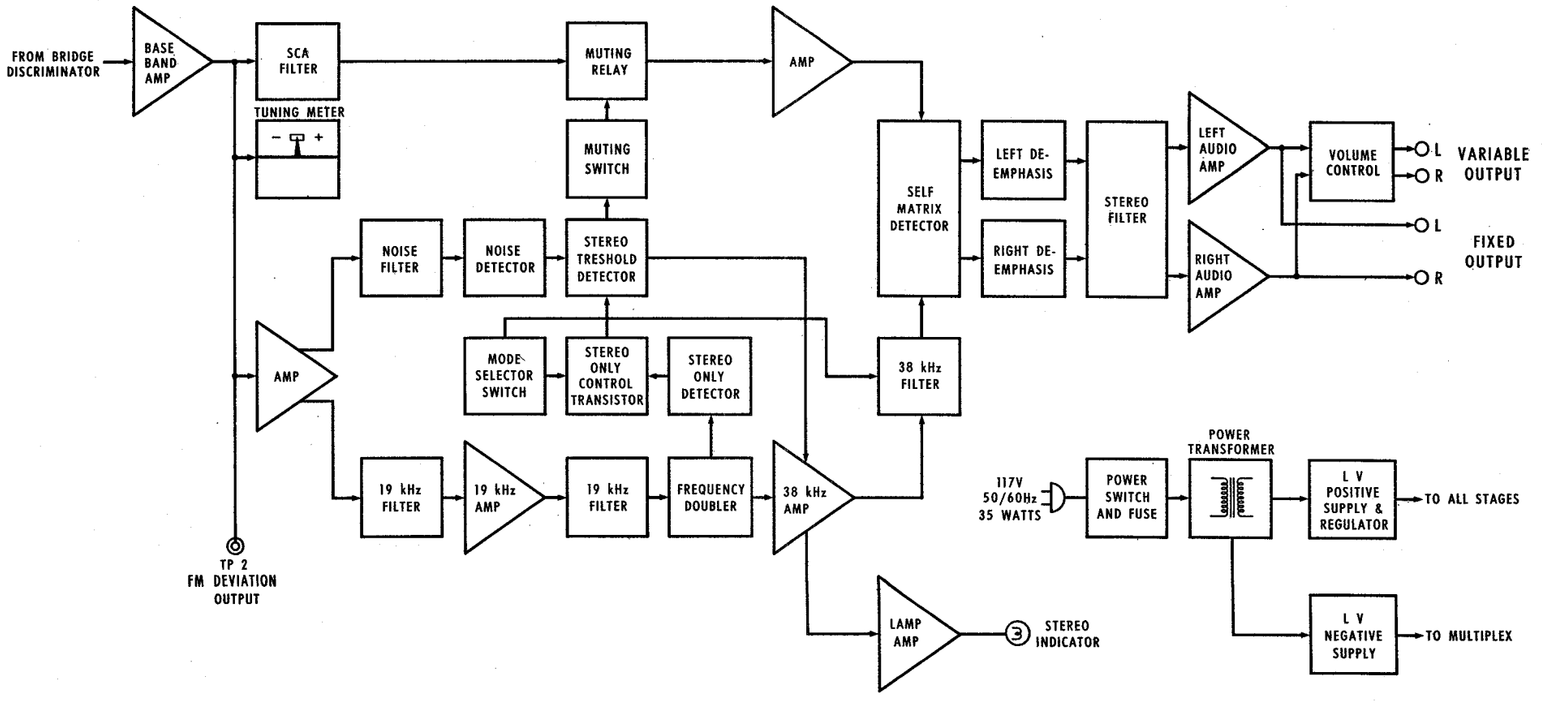
1. Unless otherwise specified: Resistance values are in ohms, 1/4 watt, and 10% tolerance; Capacitance values smaller then 1 are in microfarads (μF); capacitance values greater than 1 are in picofarads (pF); inductors are in microhenries (μH).
2. Printed circuit board components are outlined on the schematics by dotted lines. The circled numbers around the dotted lines correspond to the numbers on the PC Board layouts.
3. The heavy lines on the schematics denote the primary signal path.
4. The terminal numbering of rotary switches is for reference only.
5. All voltages indicated on the schematics are measured under the following conditions:
   a. Use of an 11 megohm input impedance VTVM.
   b. All voltages ±10% with respect to chassis ground.
   c. No signal at input or antenna terminals.
   d. AC input at 120 volts, 50/60 Hz.
   e. Front panel controls at:

Tuning indicator	100MHz (no signal)	Muting	Out
Volume	Fully CW	Mode	Auto
Selectivity	Normal	Meter	Sig. Strength
Filter	Out	Panel Lights	Bright

6. In units with Serial No's. below AD1501 R612 is 3.3k and R613 is 150k.
7. In units with Serial No's. below AD1508 C602 and C603 are .01μF.

MR 78 BLOCK DIAGRAM





FM ANTENNA

GND

300 Ω

75 Ω

T1

C2 100 pF

D1

L1

C3 12 C4 C5 C6 8.2 C7 0.1 pF

L2

Q1 6.4V R3 39 Q2 7.1V 22V R4 68 7.9V

C15 6.8 C16 C17 C18 12 C19 0.18 pF C1-C C14 .001 L3 L4

C11 .001 C12 .001

D2 D3

R1 1.2K ½W R2 12K C8 .001 C9 .001

C33 18 pF R6 4.7K

R5 8.2K C10 .001 R7 68 R8 68 C20 .001 R9 220 C22 1.5

L6 75 MH C13 .001

R10 10K C21 .001 19V 11V 11V Q3 C23 1.5

R11 15K R12 1.5K C24 .001

L5 C1-E C25 0.5-3A C26 C27 9 NPO

RF CHASSIS

S1 ANTENNA MATCHING

+24 −12

8.4V 8.4V R13 4.7K 8.8V IC1 16V 16V 1.6V 1.6V 16V

C29 270 pF C30 270 pF C31 .001 C32 270 C28 .001 R14 680

T2

SUPER NARROW FILTE XF-10

C101 5 pF D101 IN

R101 12K R114 1K R102 1K C105 .001

R106 8.2K D104 C102 .001 0V

L7 1.5 MH

IF CHASSIS

15V

IF PC BOARD 044-352

R233 1.5K C216 .001 R210 390 R222 180

C202 .22 pF

T201 T202 C201 .82 pF

IF INPUT 14V

C241 .01

M401 MID SCALE ADJ. R212 25K R211 3.3K C217 .01 R215 1.5K C226 .01

C214 .01 2.5V 0.6V 12.3V 5V

T205 C222 T206 0.22 pF C221 0.82 pF

C227 T207 0.22 pF

D202 D205 C212 .001 D204 D203

T203 C207 0.22 pF C208 0.82 T204 C209 0.33 pF

R206 10K C215 33 C213 .01 IC 201 4.6V

R207 100K R209 470 R208 2.2K C218 470 D206 C219 .001

R203 1.5K C206 .01

D201 R201 470 Q201 C203 .01 R202 180 C204 .001 7V

C205 .001 24V

R204 12K R205 12K C210 .001 C211 .01 24V

D207 C220 .001 0V 47K TP1

D208 R214 470 Q202 C223 .01 R213 180 C224 .001 7V

TO PIN 9 OUTPUT AMP PC BOARD

TUNER SECTION

MR 78 154-618

SUPER NARROW FILTER ASSEMBLY

XF-101

IC1

IC 201

IC 202

Q101

Q102

Q202

T2

T205

T206

T207

T208

SEL JUNCTION PC BOARD 044-353

SELECTIVITY LAMPS

SECT 1 FRONT

SECT 1 REAR

SECT 2 FRONT

S2 SELECTIVITY

-12V TO POWER SUPPLY PC BOARD

+10V DC

TO IF INPUT

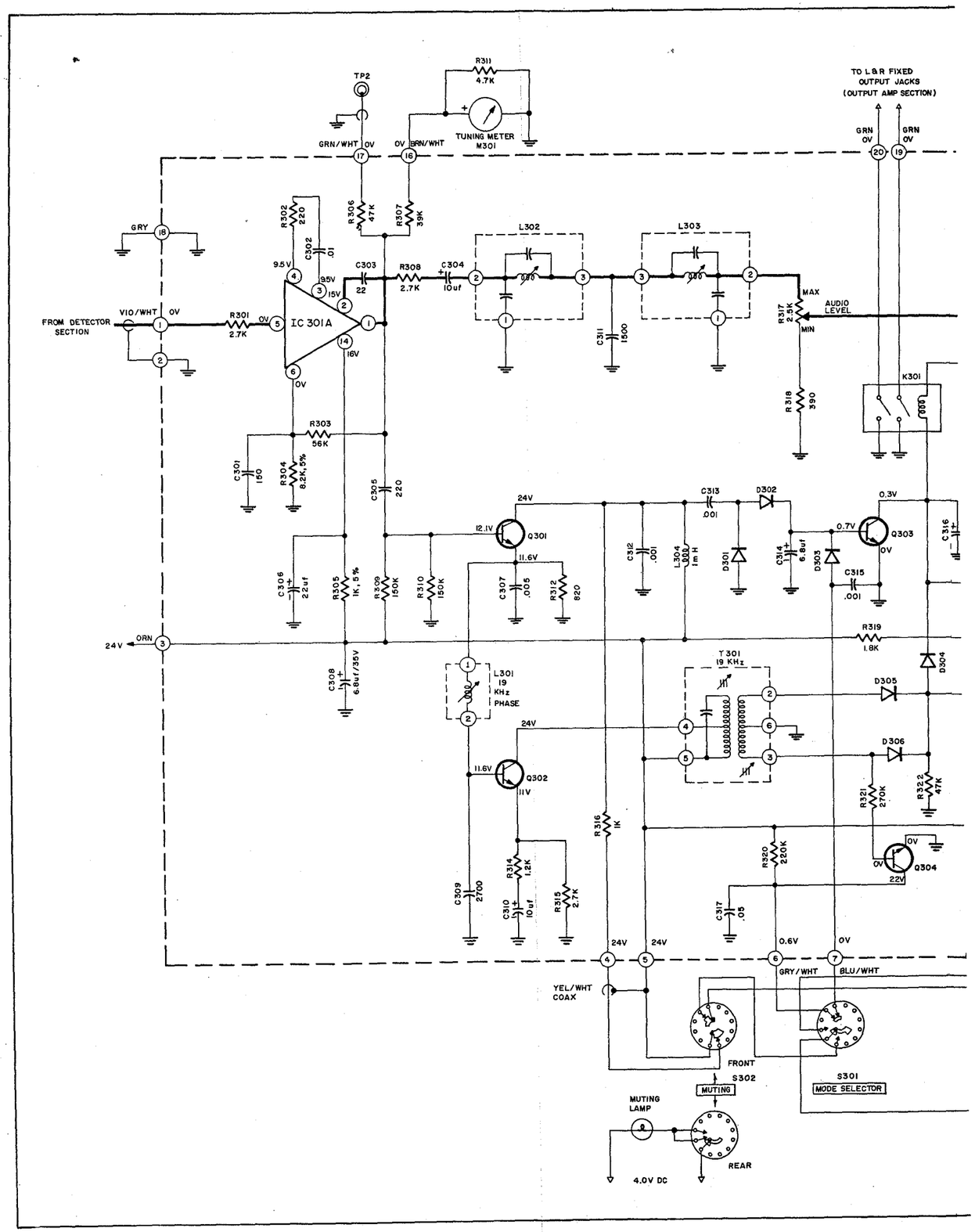
TO DETECTOR PC BOARD

TO PIN 9 OUTPUT AMP PC BOARD

M401 FULL SCALE ADJ.

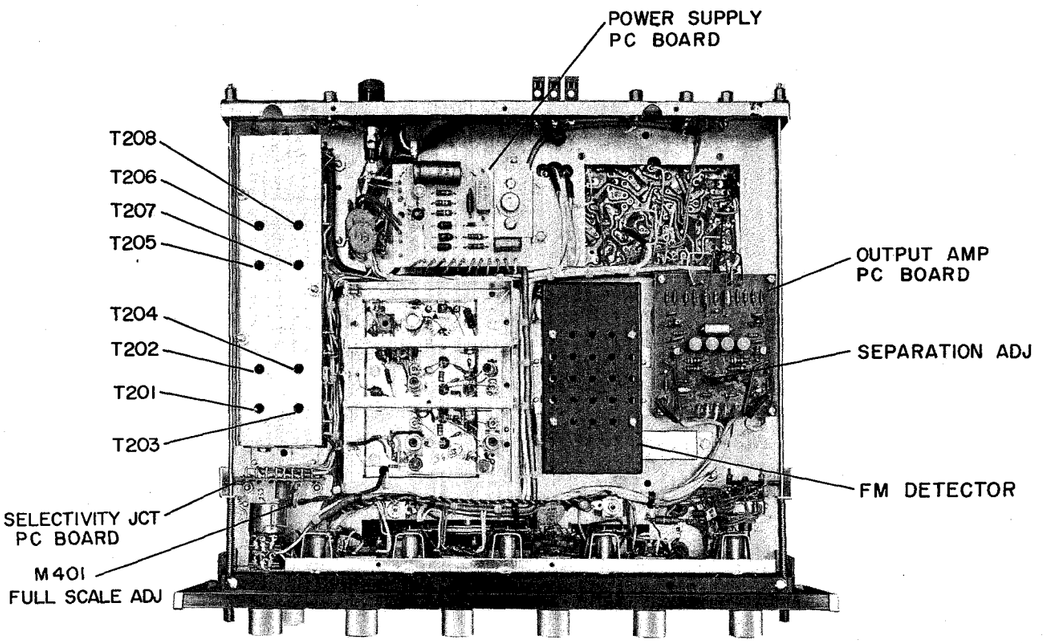
M401 MID SCALE ADJ. R212 25K

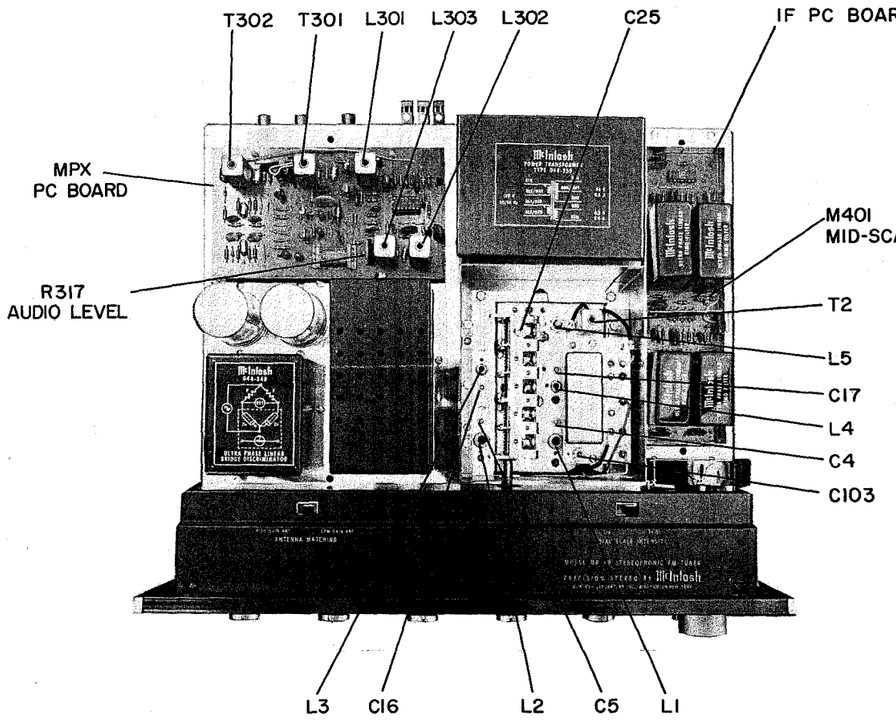
TP1


TP2
R311
4.7K
TUNING METER
M301
TO L&R FIXED
OUTPUT JACKS
(OUTPUT AMP SECTION)
GRN/WHT OV
OV BRN/WHT
GRN OV
GRN OV
GRY
R302
220
C302
.01
R306
47K
R307
39K
L302
L303
9.5V
C303
22
R308
2.7K
C304
10uf
MAX
AUDIO
LEVEL
MIN
R317
2.2K
VIO/WHT OV
FROM DETECTOR
SECTION
R301
2.7K
IC 301A
9.5V
15V
16V
OV
C311
1500
R318
390
K301
R303
56K
C301
150
R304
8.2K,5%
C305
220
24V
12.1V
Q301
11.6V
C313
.001
D302
0.3V
0.7V
Q303
0V
C316
C312
.001
L304
1mH
D301
C314
6.8uf
D303
C315
.001
C306
22uf
R305
1K,5%
R309
150K
R310
150K
C307
.005
R312
820
R319
1.8K
D304
24V ORN
T301
19 KHz
D305
L301
19
KHz
PHASE
C308
6.8uf/35V
24V
11.6V
Q302
11V
D306
R321
270K
R322
47K
R316
1K
R320
220K
0V
0V
Q304
22V
C309
2700
R314
1.2K
C310
10uf
R315
2.7K
C317
.05
24V
24V
0.6V
0V
GRY/WHT
BLU/WHT
YEL/WHT
COAX
FRONT
S302
MUTING
S301
MODE SELECTOR
MUTING
LAMP
REAR
4.0V DC

MPX SECTION

MR 78 154-619





MR 78 ALIGNMENT INSTRUCTIONS

All McIntosh tuners are carefully aligned and tested at the factory using the finest available test equipment. All McIntosh tuners will meet their published specifications when shipped from the factory.

After extensive operation, or servicing, it may be desirable to realign the tuner circuits for best performance. The charts below give complete information on the circuit realignment procedure for the MR 78.

The test equipment listed (or its equivalent) is necessary to properly align an MR 78. The accuracy of the alignment will be directly related to the accuracy and calibration of the test equipment used.

If the necessary test equipment is not available, alignment should not be attempted. For additional information, contact Customer Service Department, McIntosh Laboratory, Inc., 2 Chambers Street, Binghamton, New York 13903 (telephone 607-723-3512)

Alignment should be done in the following order: FM-MPX.

TEST EQUIPMENT REQUIRED

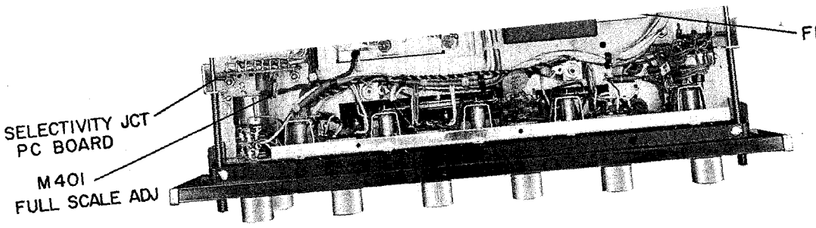
1. FM Signal Generator (Measurement 188 or Sound Technology 1000A).
2. VTVM (RCA WV96C)
3. Multiplex Generator (Radiometer SMG1) or Sound Technology 1000A.
4. 10.7 MHz FM Sweep Generator (Kay 385 or equivalent). (Not needed if Measurement 275 IF converter is available.)
5. 10.7 MHz Generator (preferably crystal controlled).
6. Oscilloscope (Hewlett-Packard 120B or equivalent).
7. Harmonic Distortion Analyzer (Hewlett-Packard 333A or equivalent).
8. 10.7 MHz ±75 kHz Sweep Marker Generator.

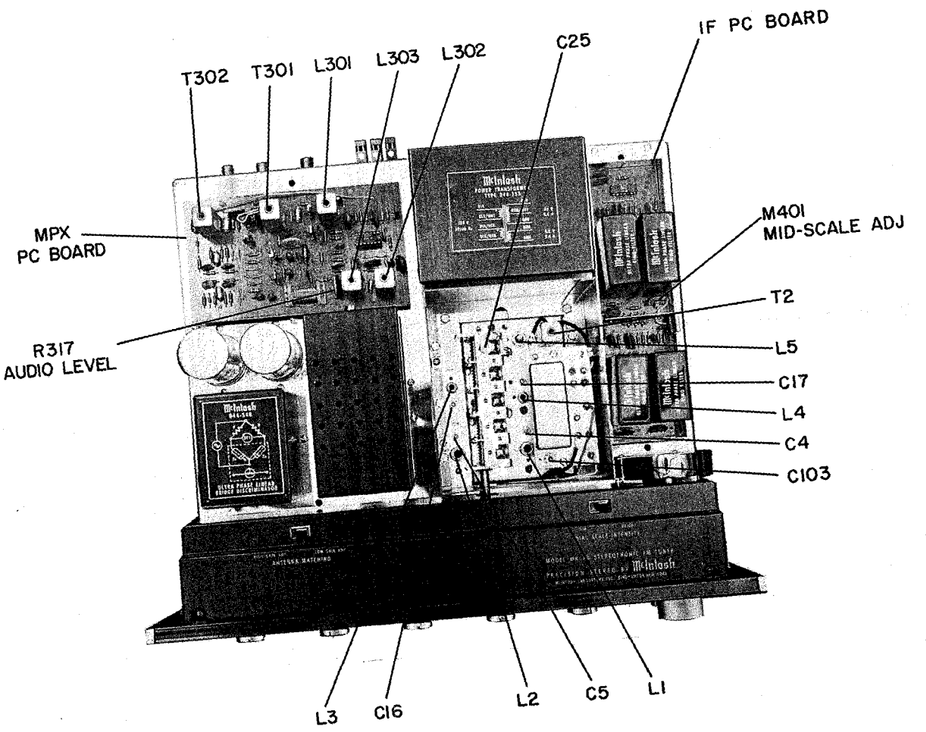
FM ALIGNMENT

NOTES:

1. Begin alignment procedure with selectivity switch in normal position, stereo filter out, muting off, mode on mono, and meter on signal strength.
2. If tuner's RF curcuits are known to be working, the IF alignment (Steps 1 - 4) may be performed using an 88 - 108 MHz generator (such as Sound Technonogy 1000A).

STEP	TUNER DIAL SETTING	SIGNAL GENERATOR			INDICATOR		ADJUST	TEST LIMITS	REMARKS
		FREQ.	COUPLING	MODULATION	TYPE	CONNECTED TO			
	Point of no inter-	10.7 MHz or point	Inject 10.7 MHz	FM ±200 kHz sweep @60	Oscillo-scope.	TP 1	Top (primary)	Maximum height of	Keep signal generator output low to prevent limiting. TP 1 voltage should not exceed 0.5





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7. Harmonic Distortion Analyzer (Hewlett-Packard 333A or equivalent).
8. 10.7 MHz ±75 kHz Sweep Marker Generator.

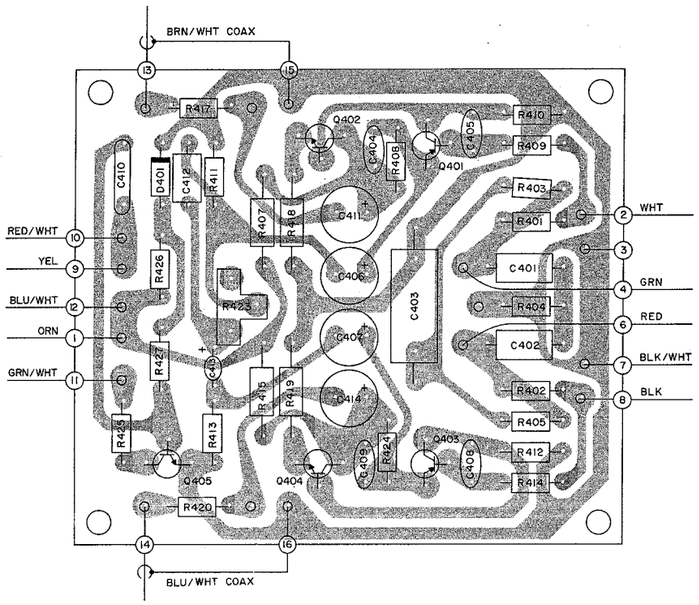
FM ALIGNMENT

NOTES:

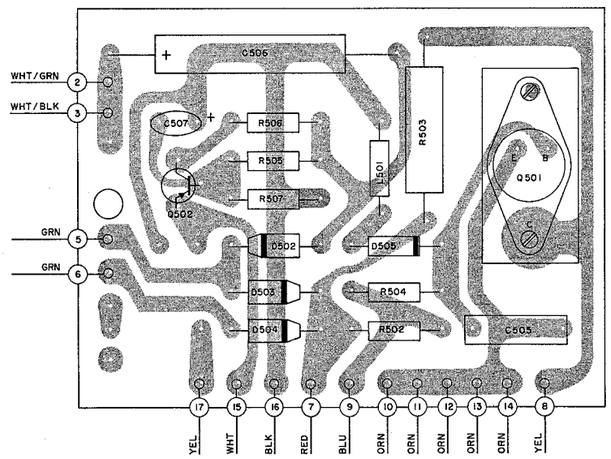
1. Begin alignment procedure with selectivity switch in normal position, stereo filter out, muting off, mode on mono, and meter on signal strength.
2. If tuner's RF curcuits are known to be working, the IF alignment (Steps 1 - 4) may be performed using an 88 - 108 MHz generator (such as Sound Technonogy 1000A).

STEP	TUNER DIAL SETTING	SIGNAL GENERATOR			INDICATOR		ADJUST	TEST LIMITS	REMARKS
		FREQ.	COUPLING	MODULATION	TYPE	CONNECTED TO			
1	Point of no interference.	10.7 MHz or point of no interference between 88-108 MHz.	Inject 10.7 MHz near IF Chassis or 88-108 MHz to tuner antenna terminals.	FM ±200 kHz sweep @60 Hz rate.	Oscilloscope.	TP 1	Top (primary) and bottom (secondary) of T2.	Maximum height of 10.7 MHz marker and best symmetry of 10.7 MHz ±75kHz markers.	Keep signal generator output low to prevent limiting. TP 1 voltage should not exceed 0.5 volts. Rimo filters do not have a flat-topped response. See typical response curve (Fig. 2). If proper response cannot be obtained go to Step 2. Otherwise go to Step 3. Bottom covers must be on front end and discriminator chassis. Regeneration will distort sweep if either cover is removed.
2	Same	Same	Same	Same	Same	Same	Use standard insulated hex tool. Top and bottom cores of Rimo filters accessible thru bottom of IF Chassis	Same	Carefully peak top and bottom cores of T201,T202, T205, and T206 for maximum gain at 10.7 MHz (center of IF bandpass), and then touch up all cores for best symmetry to obtain bandpass on opposite page. Do not stagger tune. Do not touch any other IF tuned circuits. Be sure selectivity switch is in normal position.

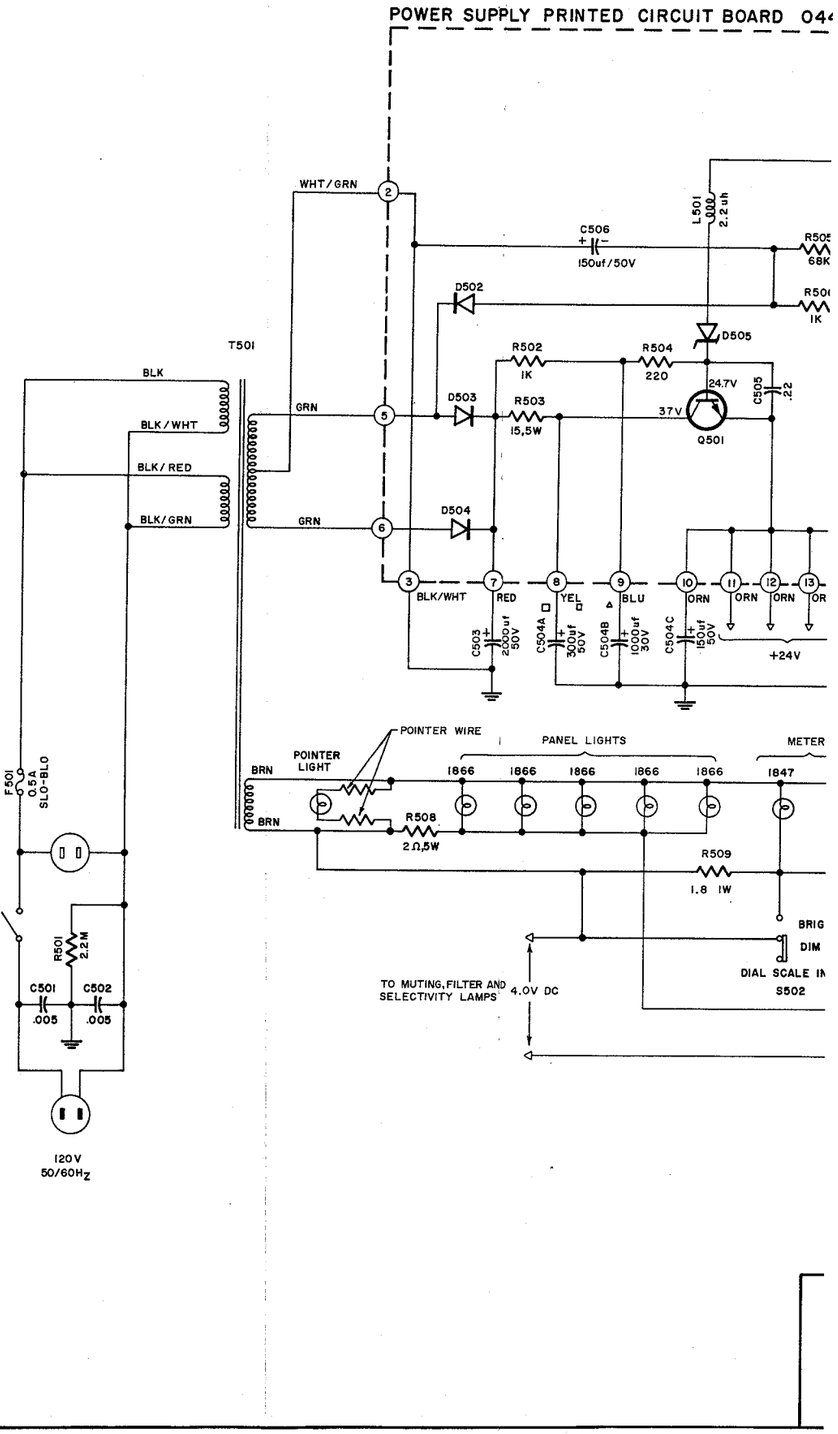
OUTPUT AMP PC BOARD 044-349



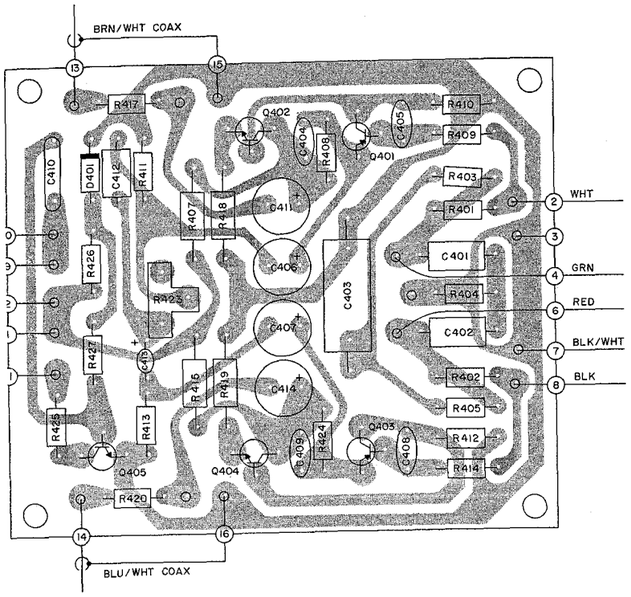
POWER SUPPLY PRINTED CIRCUIT BOARD 044-453



POWER SUPPLY PRINTED CIRCUIT BOARD 044



OUTPUT AMP PC BOARD 044-349



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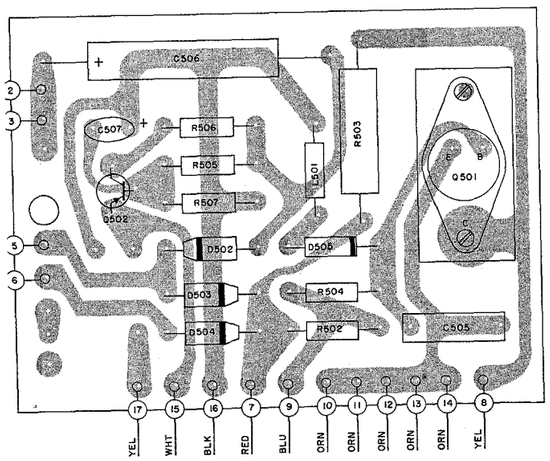

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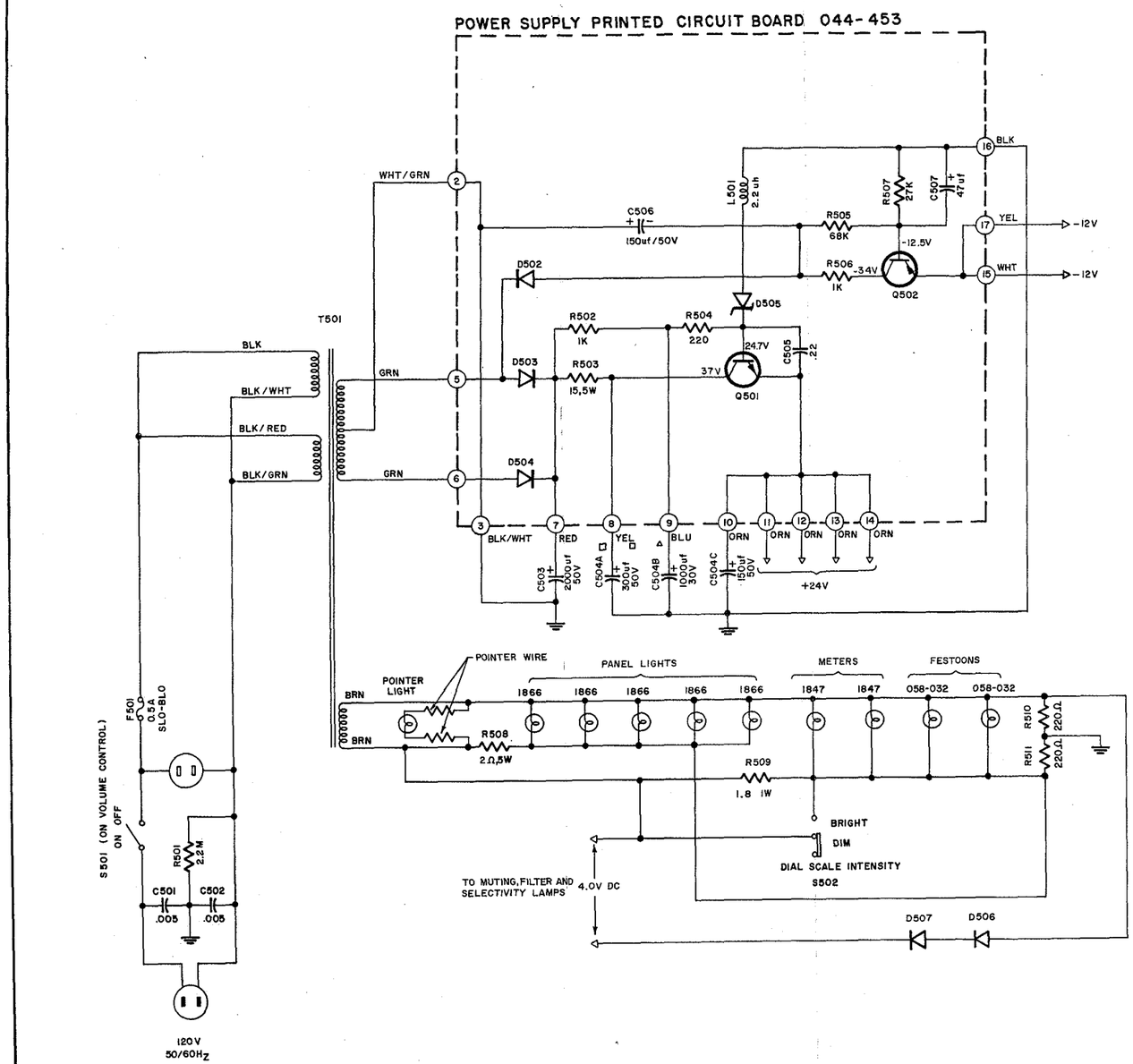


POWER SUPPLY SECTION

MR78 154-547

				Move selectivity switch to Narrow Position.					
3	Same	Same	Same	Same	Same	Same	Same	Same	Carefully peak top and bottom cores of T203,T204, T207, and T208 for maximum gain at 10.7 MHz (center of IF bandpass), and then touch up all cores for best symmetry to obtain bandpass in Fig. 3 below. Do not stagger tune. Do not touch any adjustments done in Step 2 above.
				Move selectivity switch to Super Narrow Position.					
4	Same	Same	Same	Same	Same	Same	Use insulated screw driver.	Same	Adjust C103 on top of Super Narrow IF Chassis for maximum symmetrical bandpass. Do not touch any adjustments made in Step 2 or 3 above.
				Move selectivity switch to Normal Position.					
5	Same	10.7 MHz	Inject Signal near IF Chassis.	CW	VTVM	TP2	M301 adjust R610.	Zero DC at TP 2.	With tuner horizontal and right side up, M301 should be centered. 10.7 MHz frequency must be precise for this adjustment.
6		10.7 MHz or 88-108 MHz.	Inject Signal near IF Chassis or tuner antenna terminals.	FM ±75 kHz @ 60 Hz rate.	Oscillo-scope.	Fixed audio output jacks.	Bias pot R603.	Maximum audio output.	If output is clipped, reduce audio output by adjusting R317; muting off, stereo filter out.
7	106 MHz.	106MHz	300Ω antenna terminals thru matching network or balun.	400Hz; 75KHz deviation (Fig. 1)	VTVM to TP 1 and scope to L or R audio output.		Oscillator trimmer C25	Maximum negative voltage at TP 1.	Keep TP 1 voltage below one volt. Observe signal on scope for reference.
8	90 MHz	90 MHz	Same	Same	Same		Oscillator Coil L5.	Same	Same. Repeat Steps 5 and 6 until dial is accurate.
				Antenna selector switch should be in the High Gain Position for the following:					
9	104 MHz	104 MHz	Same	Same	Same		Adjust C5, C16, and C17.	Same	Keep TP 1 voltage below one volt. Reduce signal input as circuits align.
10	92 MHz	92 MHz.	Same	Same	Same		L2,L3,L4.	Same	Same
11	104 MHz	104 MHz	Same	Same	Harmonic distortion analyzer to L or R output.		C4	Adjust for minimum noise and distortion at 5μV input.	Noise and distortion should be more than 30dB down. Noise with no modulation should be more than 40dB sown. Touch up C5, C16, and C17 if necessary.
12	92 MHz	92 MHz	Same	Same	Same		L1	Same	Touch up L2, L3, And L4 only if necessary.
13	Repeat Steps 9 and 10 until no further improvement is possible. Always adjust for minimum noise and distortion.								
14	92 MHz	92 MHz	Same	1 kHz at ±75 kHz deviation or Sound Technology Dual Sweep	Harmonic distortion analyzer to L or R output or Sound Technology to L or R output.		R603	Minimum distortion should be less than 0.2%.	A very low distortion FM generator is necessary. Sound Technology 1000A is recommended. Typical MR 78 distortion is 0.05% in this test. Minimum distortion should correspond closely to maximum audio output. If Sound Technology 1000A is used, adjust R603 for smoothest horizontal dual-sweep pattern. Refer to Sound Technology manual. Check 1kHz harmonic distortion.
15	Same	Same	Same	1 kHz at ±75 kHz deviation.	Oscilloscope connected to L or R output.		R610	Reduce signal strength until noise appears on tips of signal. If necessary, adjust R610 so that tuning meter is centered.	
				Move antenna selector switch to Low Gain Position.					
16	Same	Same	Same	Same	Harmonic distortion analyzer to L or R output.			Set generator for 2.5μV output in 300Ω.	Total noise and distortion should be more than 30dB sown. Noise with no modulation should be more than 40dB down.
17	104 MHz	Same	Same	Same	Same			Same	Same IF distortion and noise are out of spec., repeat Steps 11 thru 13. Be sure selectivity switch is in normal.
18	IF Gain Check With Selectivity Switch. Feed a 100% modulated 1 kHz mono signal to the tuner and set signal generator RF level to 10μV. Move selectivity switch to all three positions and observe signal strength. meter. (Meter switch should be on signal strength.) Repeat with RF levels of 100, 300, 1000, 10,000, and 100,000μV. The signal strength meter should not very more than one S-unit when selectivity switch is moved. If it does, there is a gain variation in the IF amplifier due to malfunction or misalignment. Recheck alignment Steps 1 thru 4. Check M401 calibration. With selectivity on broad, M401 should read 6 on a 500μV signal and 10 on a 30,000μV signal. If not, adjust R212 to read 6 on a 500μV signal and R226 to read 10 on a 30,000μF signal. (Antenna selector should be in low gain position.)								

MULTIPLEX DECODER ALIGNMENT

11					analyzer to L or R output.		distortion at 5μV input.	necessary.
12	92 MHz	92 MHz	Same	Same	Same	L1	Same	Touch up L2, L3, And L4 only if necessary.
13	Repeat Steps 9 and 10 until no further improvement is possible. Always adjust for minimum noise and distortion.							
14	92 MHz	92 MHz	Same	1 kHz at ±75 kHz deviation or Sound Technology Dual Sweep	Harmonic distortion analyzer to L or R output or Sound Technology to L or R output.	R603	Minimum distortion should be less than 0.2%.	A very low distortion FM generator is necessary. Sound Technology 1000A is recommended. Typical MR 78 distortion is 0.05% in this test. Minimum distortion should correspond closely to maximum audio output. If Sound Technology 1000A is used, adjust R603 for smoothest horizontal dual-sweep pattern. Refer to Sound Technology manual. Check 1kHz harmonic distortion.
15	Same	Same	Same	1 kHz at ±75 kHz deviation.	Oscilloscope connected to L or R output.	R610	Reduce signal strength until noise appears on tips of signal. If necessary, adjust R610 so that tuning meter is centered.	
	Move antenna selector switch to Low Gain Position.							
16	Same	Same	Same	Same	Harmonic distortion analyzer to L or R output.		Set generator for 2.5μV output in 300Ω.	Total noise and distortion should be more than 30dB sown. Noise with no modulation should be more than 40dB down.
17	104 MHz	Same	Same	Same	Same		Same	Same IF distortion and noise are out of spec., repeat Steps 11 thru 13. Be sure selectivity switch is in normal.
18	IF Gain Check With Selectivity Switch. Feed a 100% modulated 1 kHz mono signal to the tuner and set signal generator RF level to 10μV. Move selectivity switch to all three positions and observe signal strength. meter. (Meter switch should be on signal strength.) Repeat with RF levels of 100, 300, 1000, 10,000, and 100,000μV. The signal strength meter should not very more than one S-unit when selectivity switch is moved. If it does, there is a gain variation in the IF amplifier due to malfunction or misalignment. Recheck alignment Steps 1 thru 4. Check M401 calibration. With selectivity on broad, M401 should read 6 on a 500μV signal and 10 on a 30,000μV signal. If not, adjust R212 to read 6 on a 500μV signal and R226 to read 10 on a 30,000μF signal. (Antenna selector should be in low gain position.)							

MULTIPLEX DECODER ALIGNMENT

STEP	TUNER DIAL SETTING	SIGNAL GENERATOR FREQ.	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR MODULATION	INDICATOR TYPE	INDICATOR CONNECTED TO	ADJUST	TEST LIMITS	REMARKS
1	100 MHz or point of no interference	Same as tuner dial	300Ω antenna terminals with approximately 1000μV signal thru matching network or balun	Mono (R = L) 1 kHz 100% modulation	Oscilloscope and AC-VTVM connected to either fixed audio output jack.		R317	2.5V RMS at fixed output jacks	Make sure tuning meter is at zero center. Maximum indication on signal strength meter and center indication on tuning meter should coincide.
2	Same	Same	Same	67kHz and 53kHz at ±75kHz deviation	Oscilloscope	Pin 13 of I_C on stereo decoder board	L302 and L303	Adjust L302 for maximum 53kHz, L303 for minimum 67kHz. Do not attempt to detect 67kHz at tuner output jacks. Ground scope probe close to multiplex board. Repeat adjustments of L302 and L303 until optimum condition is reached.	
3	Same	Same	Same	19 kHz pilot	Oscilloscope	Base of Q305	L301 and T301	For maximum amplitude	Decrease pilot level, if necessary, so that 19 kHz circuits do not limit or saturate.
4	Same	Same	Same	Same	Oscilloscope	T302 Pin 1 or 2	T302 top and bottom	Maximum amplitude	Use normal (9%) pilot level. Remove scope probe before going to Step 5.
5	Same	Same	Same	Stereo 1 kHz (100% modulation) left only pilot level normal and on	AC-VTVM	Right fixed output jack	T302 bottom (sec) and R4	40dB separation or more	First set R401 to maximum resistance. (Fully clockwise looking from front of tuner.) Adjust T302 bottom tuning slug (sec) for minimum output on right (undesired) channel. Then adjust R401 for maximum separation. Repeat the adjustment of T302 bottom and R401 until maximum separation is obtained. Then reverse channels and measure left channel separation.
6	Same	Same	Same	Stereo pilot carrier modulation only	AC-VTVM	L or R output jack		Less than 50MV of residual	With modulation off but pilot on. (NOTE: Stereo generator must have low spurious output.)

FIG. 1 ANTENNA MATCHING NETWORK

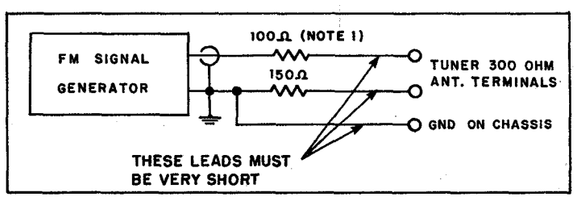


FIG. 2 TYPICAL IF RESPONSE CURVE NORMAL

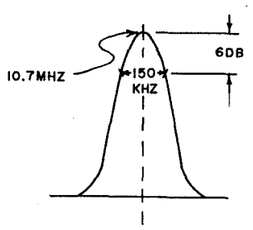
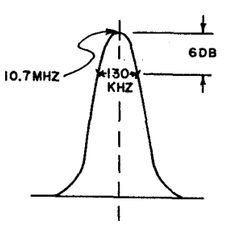


FIG. 3 TYPICAL IF RESPONSE CURVE NARROW



REPLACEMENT PARTS

All parts not listed are common items obtainable from radio parts jobbers.

Replacement parts may be obtained when ordered by PART NUMBER from:

McIntosh Laboratory, Inc.
Customer Service Department
2 Chambers Street
Binghamton, New York 13903
(telephone 607-723-3512)

CAPACITORS

C29,30	Silver Mica	270pF		063-010
C204	Elect.	10µF	35V	066-173
C304	Tant.Elect.	10wF	20V	066-149
C306	Tant.Elect.	22µF	20V	066-148
C308	Tant.Elect.	6.8µF	35V	066-146
C309	Polystyrene	2700pF		064-093
C310	Tant.Elect.	10µF	20V	066-149
C311	Polystyrene	1500pF		064-092
C314	Tant.Elect.	6.8µF	35V	066-146
C316	Tant.Elect.	6.8µF	35V	066-146
C323	Tant.Elect.	1µF	35V	066-147
C325	Tant.Elect.	22µF	20V	066-148
C326,327	Polystyrene	4700pF		064-091
C328	Tant.Elect.	6.8µF	35V	066-146
C331	Polystyrene	.0033µF		064-090
C334	Polystyrene	.0033µF		064-090
C401,402	Polystyrene	2700pF		064-093
C403	Polystyrene	.033µF		064-089
C406,407	Elect.Cap.	22µF	35V	066-179
C411	Elect.Cap.	10µF	63V	066-178
C412	Polystyrene	2700pF		064-093
C413	Tant.Elect.	1µF	35V	066-147
C414	Elect.	10µF	63V	066-178
C503	Elect.	2000µF	50V	066-154
C504	Elect.	5/300/150/1000µF 200/50/50/30V		066-155
C506	Elect.	150µF	63V	066-205
C507	Elect.	47µF	16V	066-182

DIODES

D1	Pin diode		070-055
D2	Si. signal diode		070-047
D3	Pin diode		070-055
D101,102	Si. signal diode		070-047
D103	Si. signal diode		070-047
D104,105	Ge. signal diode		070-003
D201,202	Si. signal diode		070-047
D203	Si. signal diode		070-047
D204	Ge. signal diode		070-003
D205	Si. signal diode		070-047
D206,207	Ge. signal diode		070-003
D208,209	Si. signal diode		070-047
D210	Ge. signal diode		070-003
D211,212	Si. signal diode		070-047
D213,214	Ge. signal diode		070-003
D215,216	Ge. signal diode		070-003
D301,302	Si. signal diode		070-047
D303,304	Si. signal diode		070-047
D305,306	Si. signal diode		070-047
D308,309	Si. signal diode		070-047
D310,311	Si. signal diode		070-047
D401	Si. signal diode		070-047
D502,503	Si. signal diode		070-031
D504	Si. signal diode		070-031
D505	Zener diode	24V	070-049
D506	Si. signal diode		070-031
D601,602	Si. signal diode		070-003
D603,604	Si. signal diode		070-003

CHOKES

L1	Antenna Coil	122-133
L2	RF input Coil	122-132
L3	RF output Coil	122-131
L4	Mixer Coil	122-130
L5	Oscillator Coil	122-129
L6	Choke 75µH	122-013
L7	Choke 1.7µH	122-032
L301	Filter Coil (19kHz)	122-094
L302,303	Filter Coil (SCA)	122-093
L304	Choke 1MH	122-092
L501	Choke 2.2µH	122-001

TRANSISTORS

Q1	Si. NPN transistor	132-097
Q2	Si. NPN transistor	132-066
Q3	Si. NPN transistor	132-087
Q101,102	M.O.S. F.E.T.	132-088
Q201,202	Si. Junction FET	132-068
Q301	Si. NPN transistor	132-092
Q302	Si. NPN transistor	132-094
Q303	Si. NPN transistor	132-092
Q304,305	Si. NPN transistor	132-094
Q306	Si. NPN transistor	132-095
Q401	Si. PNP transistor	132-096
Q402	Si. NPN transistor	132-090
Q403	Si. PNP transistor	132-096
Q404	Si. NPN transistor	132-090
Q405	Si. NPN transistor	132-094
Q501	Si. NPN transistor	132-065
Q502	Si. PNP transistor	132-032
Q601,602	Si. NPN transistor	132-066

FUSES

F501	Fuse .5A slo-blo	089-020

POTENTIOMETERS

R212	M401 mid scale adv.	134-260
R226	M401 full scale adv.	134-260
R317	Audio level	134-258
R422	Volume control	134-217
R423	Separation adv.	134-260
R603	Bias adv.	134-256
R610	M301 adv.	134-256

RESISTORS

R10	wire	220Ω	5%	1W	139-076
R333,334	film	33K	1%	1W	144-015
R338,339	film	33K	1%	1W	144-015
R503	wire	15Ω	10%	5W	139-041
R508	wire	2.0Ω	10%	5W	139-005
R509	wire	1.8Ω	10%	1W	139-077
R605,606	wire	220Ω	5%	1W	139-076
R607,608	film	56.2Ω	1%	1W	144-014

SWITCHES

S2	Selectivity switch	146-156
S301	Mode selector	146-160
S302	Muting switch	146-159
S401	Stereo filter switch	146-158
S402	Meter function switch	146-157

TRANSFORMERS

T1	Balun	043-226
T2	FM mixer	162-062
T201	FM IF filter input	162-053
T202	FM IF filter output	162-052
T203	FM IF filter input	162-053
T204	FM IF filter output	162-052
T205	FM IF filter input	162-053
T206	FM IF filter output	162-052
T207	FM IF filter input	162-053
T208	FM IF filter output	
T301	RF transformer (19kH:	
T302	RF transformer (38kH:	

INTEGRATED CIRCUITS

IC1	Integrated circuit
IC101,102	Integrated circuit
IC301A,13	Integrated circuit

METERS

M301	Tuning meter
M401	Signal strength mete

RELAY

K301	Reed relay

LAMPS

Function lamp
Stereo lamp
#1847 (Meter lamp)
#1866 (Front panel)
Festoon lamp (Dial g

FRONT PANEL & TRIM

Front panel
Front panel end caps
Tuning knob
Selectivity knob
Meter knob
Filter knob
Muting knob
Mode knob
Volume knob

MOUNTING SYSTEM

Shelf brkt (right)
Shelf brkt (left)
Mounting temp #100
Hardware Package

MISCELLANEOUS ITEMS

FM dipole antenna
Dial glass
Pointer
Dial cord (complete)
Fuseholder
AC power cord
Shipping carton
Owners manual
Plastic feet
Push terminal (anter
Audio cable 6'

Q306	Si. NPN transistor	132-095
Q401	Si. PNP transistor	132-096
Q402	Si. NPN transistor	132-090
Q403	Si. PNP transistor	132-096
Q404	Si. NPN transistor	132-090
Q405	Si. NPN transistor	132-094
Q501	Si. NPN transistor	132-065
Q502	Si. PNP transistor	132-032
Q601,602	Si. NPN transistor	132-066
	FUSES	
F501	Fuse .5A slo-blo	089-020
	POTENTIOMETERS	
R212	M401 mid scale adv.	134-260
R226	M401 full scale adv.	134-260
R317	Audio level	134-258
R422	Volume control	134-217
R423	Separation adv.	134-260
R603	Bias adv.	134-256
R610	M301 adv.	134-256
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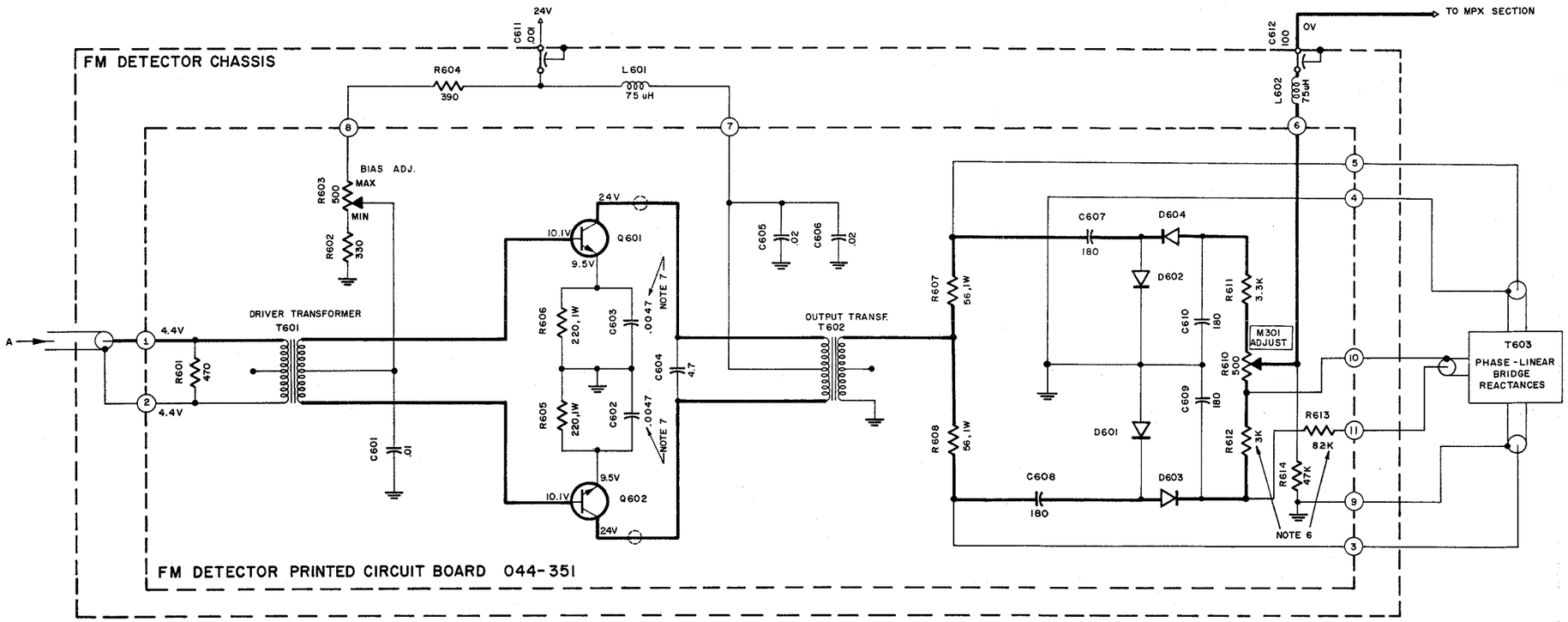
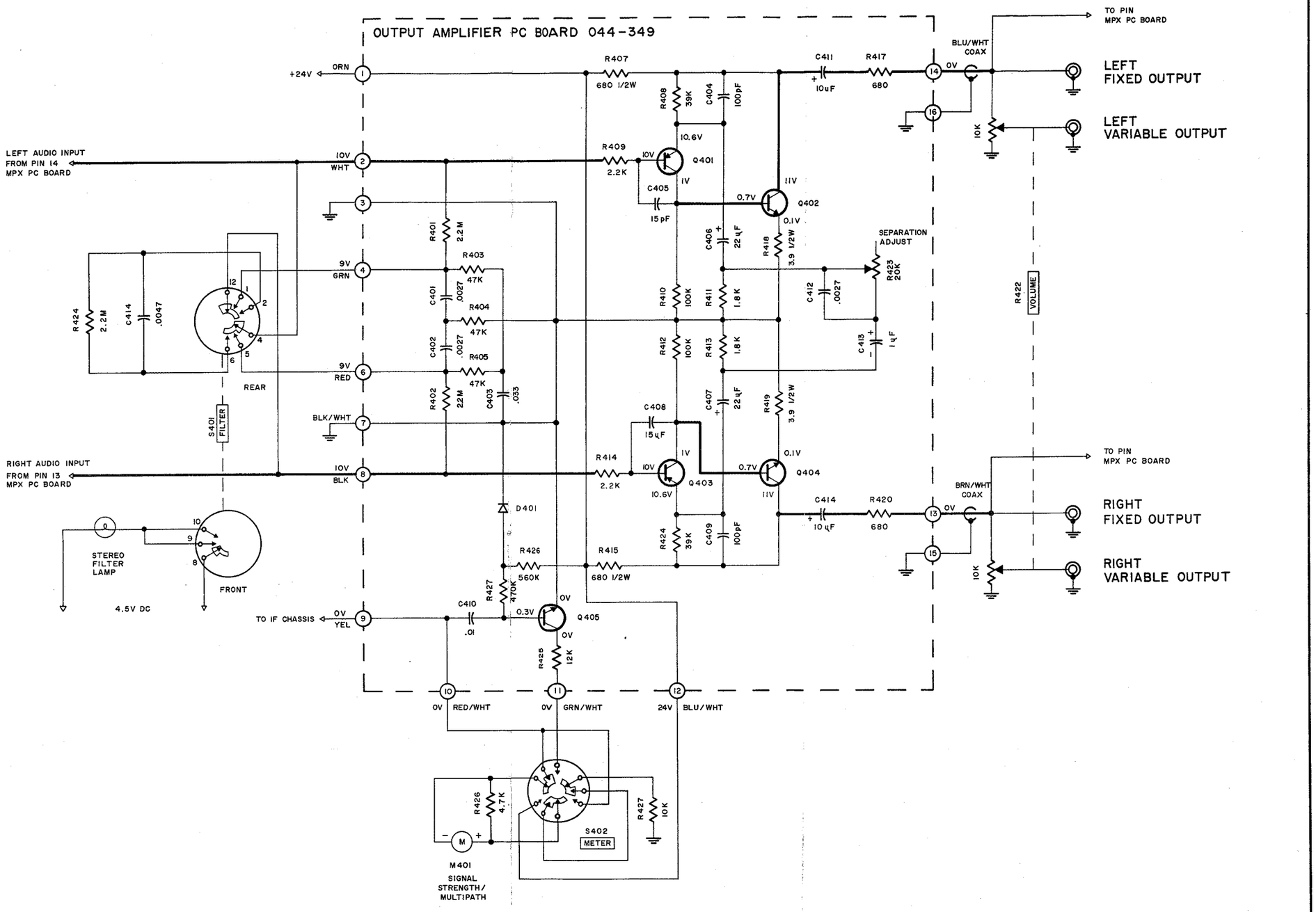
R333,334	film 33K 1% 1W	144-015
R338,339	film 33K 1% 1W	144-015
R503	wire 15Ω 10% 5W	139-041
R508	wire 2.0Ω 10% 5W	139-005
R509	wire 1.8Ω 10% 1W	139-077
R605,606	wire 220Ω 5% 1W	139-076
R607,608	film 56.2Ω 1% 1W	144-014
	SWITCHES	
S2	Selectivity switch	146-156
S301	Mode selector	146-160
S302	Muting switch	146-159
S401	Stereo filter switch	146-158
S402	Meter function switch	146-157
	TRANSFORMERS	
T1	Balun	043-226
T2	FM mixer	162-062
T201	FM IF filter input	162-053
T202	FM IF filter output	162-052
T203	FM IF filter input	162-053
T204	FM IF filter output	162-052
T205	FM IF filter input	162-053
T206	FM IF filter output	162-052
T207	FM IF filter input	162-053
T208	FM IF filter output	162-052
T301	RF transformer (19kHz)	162-055
T302	RF transformer (38kHz)	162-054
	INTEGRATED CIRCUITS	
IC1	Integrated circuit	133-006
IC101,102	Integrated circuit	133-002
IC301A,13	Integrated circuit	133-004
	METERS	
M301	Tuning meter	124-020
M401	Signal strength meter	124-019
	RELAY	
K301	Reed relay	087-008
	LAMPS	
	Function lamp	058-043
	Stereo lamp	058-042
	#1847 (Meter lamp)	058-008
	#1866 (Front panel)	058-014
	Festoon lamp (Dial glass)	058-032
	FRONT PANEL & TRIM	
	Front panel	044-345
	Front panel end caps	018-154
	Tuning knob	044-357
	Selectivity knob	044-505
	Meter knob	044-505
	Filter knob	044-505
	Muting knob	044-505
	Mode knob	044-505
	Volume knob	044-505
	MOUNTING SYSTEM	
	Shelf brkt (right)	043-592
	Shelf brkt (left)	043-593
	Mounting temp #100	038-179
	Hardware Package	044-454
	MISCELLANEOUS ITEMS	
	FM dipole antenna	170-033
	Dial glass	044-474
	Pointer	044-387
	Dial cord (complete)	044-475
	Fuseholder	178-001
	AC power cord	170-021
	Shipping carton	044-473
	Owners manual	038-671
	Plastic feet	017-041
	Push terminal (antenna)	074-033
	Audio cable 6'	170-015



DETECTOR SECTION

MR 78

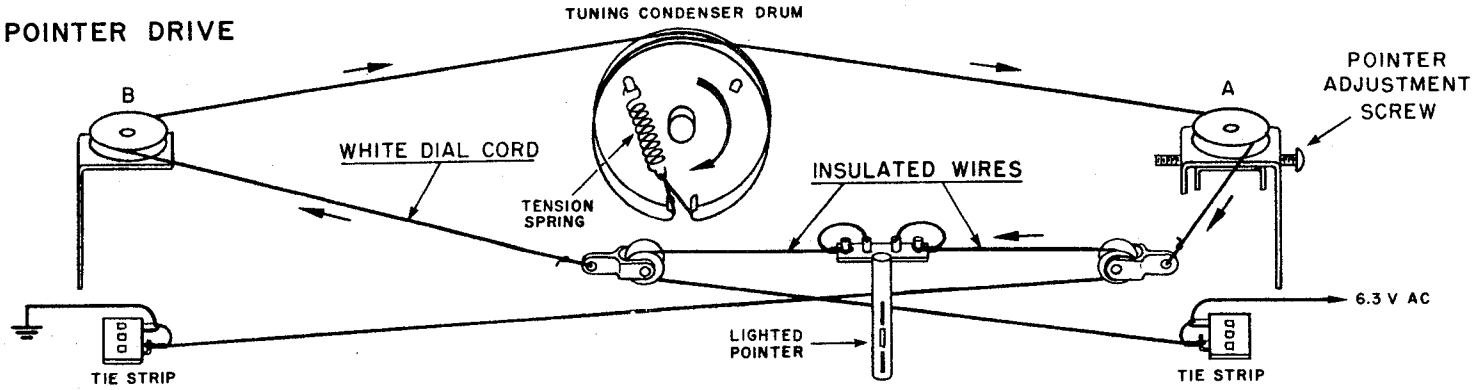
154-620



OUTPUT AMP SECTION

MR78 154-546

POINTER DRIVE



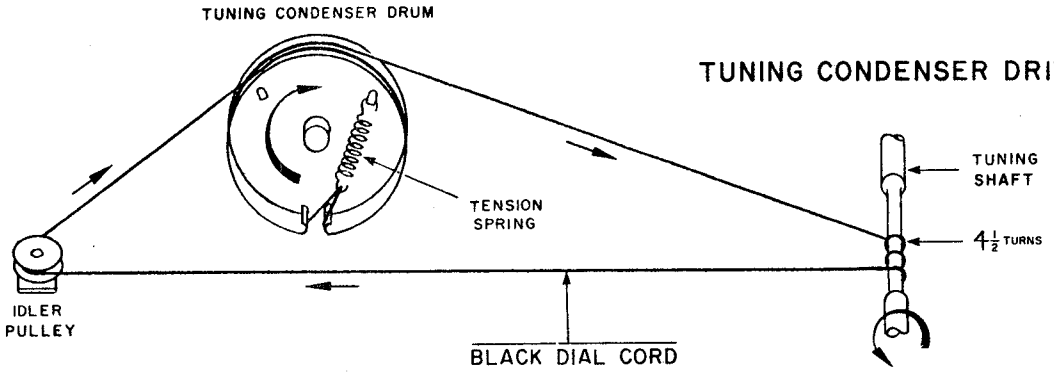
Step 1 Before stringing unit, turn pointer adjustment screw until pulley "A" is in the center of its travel.

Step 2 String unit as shown.

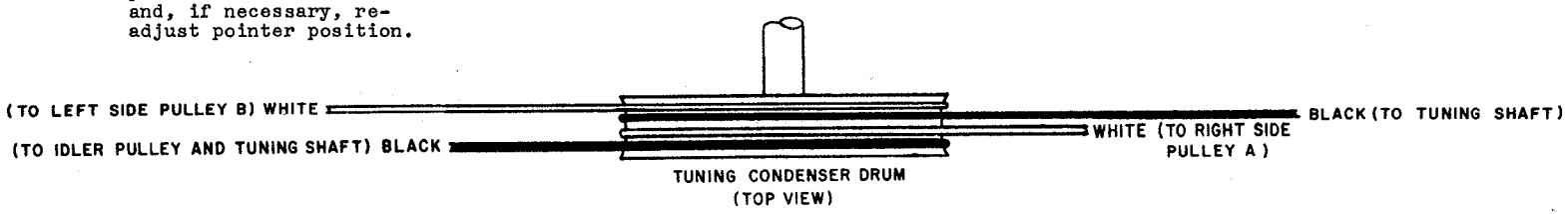
Step 3 After stringing unit, turn tuning shaft until pointer is as far to the left as it will go. Turn the pointer adjustment screw until the pointer coincides with the zero bar of the logging scale.

Step 4 Turn the tuning knob making the pointer move back and forth from one end of the dial scale to the other. Return pointer to the far left and, if necessary, re-adjust pointer position.

TUNING CONDENSER DRIVE



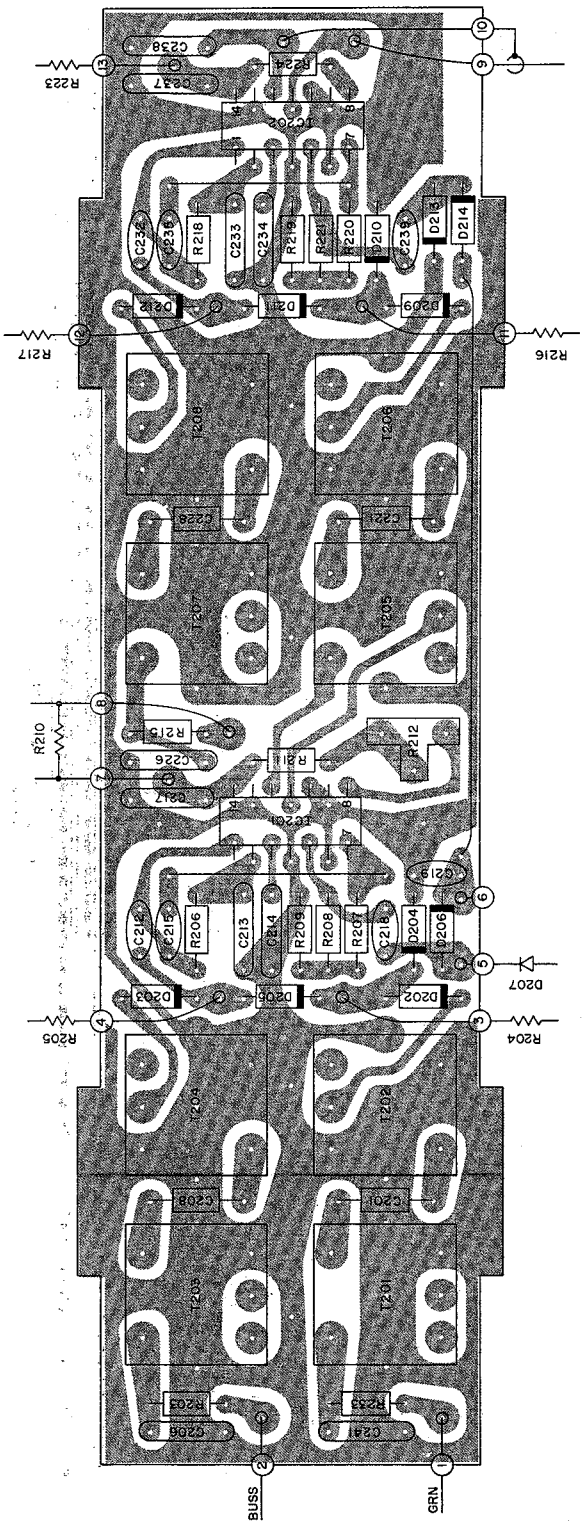
DIAL CORD SEQUENCE


(TO LEFT SIDE PULLEY B) WHITE
(TO IDLER PULLEY AND TUNING SHAFT) BLACK
WHITE (TO RIGHT SIDE PULLEY A)
BLACK (TO TUNING SHAFT)
TUNING CONDENSER DRUM
(TOP VIEW)

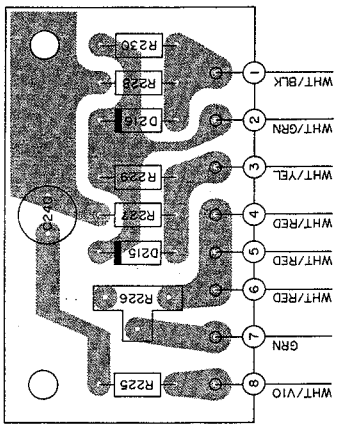
POINTER DIAL STRINGING

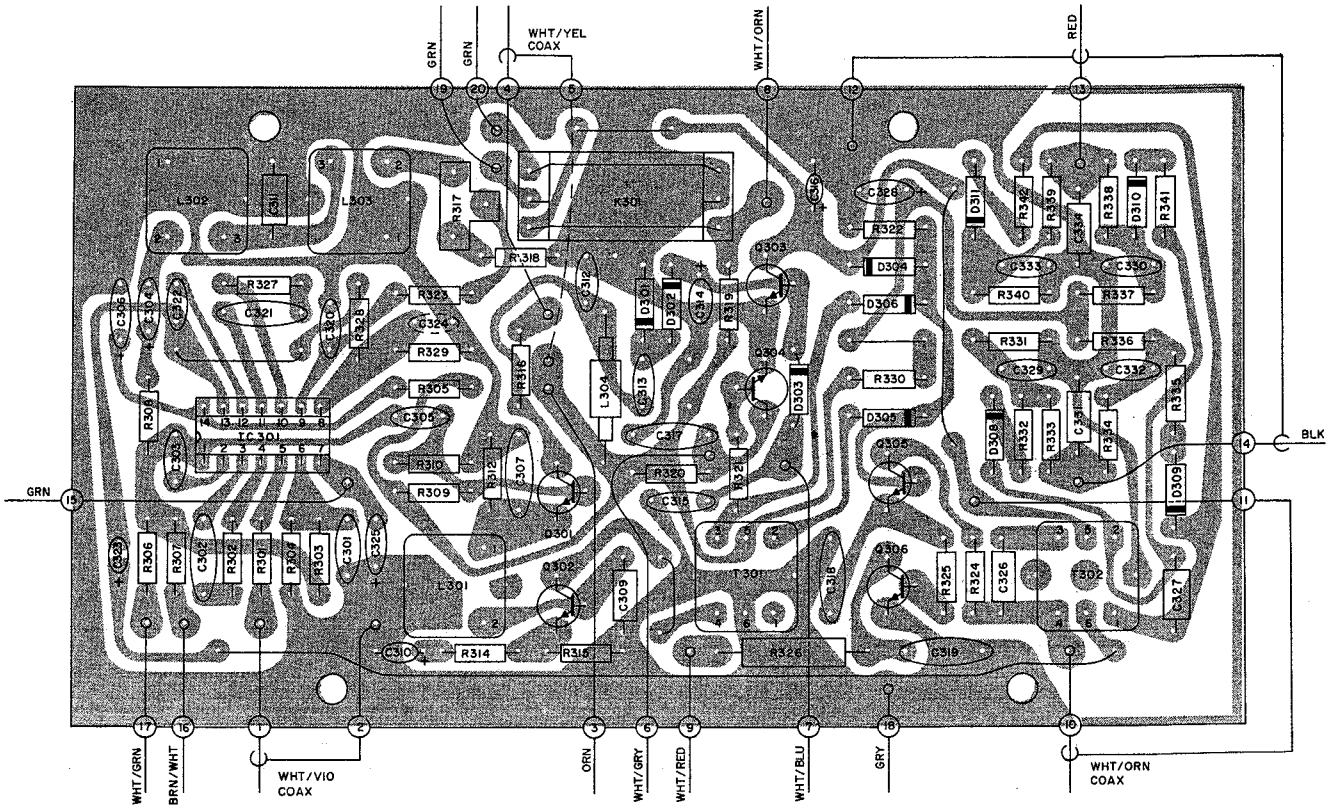
MR 78

IF PC BOARD 044-352



SELECTIVITY JCT. PC BOARD 044-353





MPX PRINTED CIRCUIT BOARD 044-228

DETECTOR PC BOARD 044-351